Small Business Innovation Research/Small Business Tech Transfer

Data Reduction and Rapid Analysis of Hyperspectral Data Sets, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

Hyperspectral sensors offer great opportunities for increasingly sensitive automated target recognition (ATR) systems though a common problem is the lack of sufficient training data. Also, the inherent high dimensionality of hyperspectral signatures requires the design of a hyperspectral ATR to have a large number of training samples. This is due to the fact that the number of training samples required is directly related to the dimensionality of the classifier. In order to avoid this problem, the hyperspectral datasets must be preprocessed, thereby reducing the dimensionality to an acceptable level. Other challenges include uncertainty associated with measurements and missing/sparse data sets. To meet these challenges, the PERL Research and Mississippi State University will develop a unique ATR system for data reduction and rapid analysis of hyperspectral data. Our proposed approach is based on the integration of two concepts: localized discriminant bases and support vector machines. Our proposed ATR system will be able to rapidly cope with limited/sparse training data while producing optimal target recognition accuracies. Furthermore, the ATR will provide a unique capability for easy integration with various sensors and other ATR systems.

Primary U.S. Work Locations and Key Partners

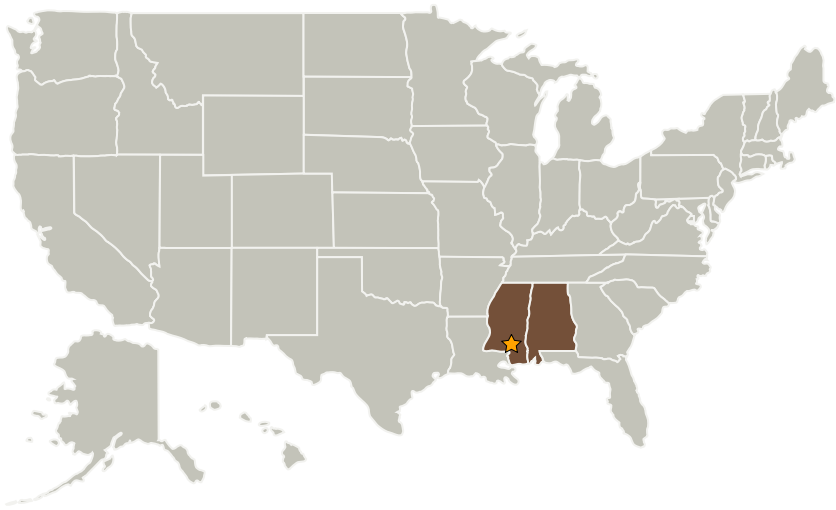

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
PERL Research, LLC	Supporting Organization	Industry	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Mississippi

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul W Cox

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.3 High Performance Processors